

**Problem Set 9**

1. A general Jones vector describing a fully coherent electromagnetic wave with a nonzero  $x$  polarized component can be written as
8. Pedrotti×2 12-14.

$$\frac{1}{\sqrt{1+b^2}} \begin{pmatrix} 1 \\ be^{i\delta} \end{pmatrix},$$

where  $b$  is real.

(a). Show that this represents elliptically polarized light in which the major axis of the ellipse makes an angle

$$\frac{1}{2} \arctan \left( \frac{2b \cos \delta}{1-b^2} \right)$$

with the  $x$  axis.

(b). How can you tell whether the light is right-hand or left-hand elliptically polarized?

(c). Show that elliptically polarized light can be written as a sum of linearly and circularly polarized light. What is the relationship between the major axis of the ellipse and the axis along which its linearly polarized component is polarized?

2. Pedrotti×2 14-5. (In their notation,  $x$  is horizontal and  $y$  is vertical. You can easily do the problem without their hint, which seems not to be of much help.)

3. Pedrotti×2 14-12. (“OA” signifies “slow axis”, and “TA” signifies “transmission axis”. They have in mind the reflection that occurs when, after passing through the isolator, the light enters a material with real refractive index  $n > 1$ .)

4. Pedrotti×2 14-22.

5. Calculate the interference pattern that would be obtained if four identical slits instead of two were used in Young’s experiment. (Assume equal spacing of the slits). Make a rough plot.

6. Pedrotti×2 12-11.

7. Pedrotti×2 12-13.